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# A Perspective on the Educational “SWOT” of the Coronavirus Pandemic



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The coronavirus pandemic has disrupted clinical practice, health-care organizations, and life. In the context that “a crisis is a terrible thing to waste,” as disruptive as the pandemic has been to traditional practices—both clinically and educationally—opportunities have also presented. Clinical benefits have included the propulsion of clinical innovation, including such items as the development of novel vaccines and accelerated understanding of multiplex ventilation. Approaches to educating students and other learners have also changed radically, with the suspension of live teaching in most instances and a precipitous transition to virtual instruction. This perspective considers a SWOT analysis (strengths, weaknesses, opportunities, and threats) associated with the coronavirus pandemic in health care that focuses on the implications for education. Although the obvious disadvantages (weaknesses) regard the loss of face-to-face interaction with all of its consequences (eg, isolation, risks to camaraderie, loss of hands-on training opportunities, and loss of in-person celebratory events like graduations and end-of-training celebrations), there are clearly offsetting strengths. These include growing experience with virtual teaching and virtual learning strategies, the invitation to codify best virtual teaching practices, a tightening of alignment between undergraduate and graduate medical education (eg, around virtual interview strategies), and opportunities for both self-reflection and a commitment to act virtuously. On balance, the pandemic has created the opportunity, indeed the necessity, to innovate in practice and in education, making the landscape ripe for creative practice, new mastery, and the concomitant benefits to learners and to educators.

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The coronavirus pandemic poses a global crisis. In the same spirit that “a crisis is a terrible thing to waste,”<sup>1</sup> President Kennedy<sup>2</sup> said “The Chinese use two brush strokes to write the word ‘crisis.’ One brush stroke stands for danger; the other for opportunity. In a crisis, be aware of the danger—but recognize the opportunity.”

Just as the coronavirus has exacted tragedy in all sectors, so too have broad opportunities been created. In the context that a commitment to education is shared by all academic medical centers,<sup>3</sup> there is value for all educators in taking stock of the educational opportunities presented by the coronavirus pandemic. This perspective, which is based on local observations that

**ABBREVIATIONS:** GME = graduate medical education; SWOT = strengths, weaknesses, opportunities, and threats; UGME = undergraduate medical education

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**TABLE 1 ]** SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis of Some Educational Impacts of the Coronavirus Pandemic

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|---|--|
| <p><b>Strengths (Advantages)</b></p> <ul style="list-style-type: none"> <li>• Accelerates the adoption of virtual instruction</li> <li>• Fosters expertise in virtual andragogy</li> <li>• Promotes virtual work</li> <li>• Accelerates hybrid models for student and trainee onboarding</li> <li>• Fosters reassessment of the need for administrative physical space in academic medical centers</li> <li>• Instances of enhanced teamwork, participation, and communication compared with prior face-to-face work</li> <li>• Can enhance participation in virtual meetings, either because travel time to physical meetings is curtailed or because some who are normally reluctant to participate in live meetings may find the “chat box” a more comfortable option</li> </ul> | <p><b>Weaknesses (Disadvantages)</b></p> <ul style="list-style-type: none"> <li>• Conditions at home may be distracting for some</li> <li>• Loss of spontaneous interactions (ie, no “water cooler” dialogs)</li> <li>• Loss of opportunity for important in-person ceremonies/celebrations (eg, graduations for medical student and trainees)</li> <li>• Risk of erosion of camaraderie</li> <li>• Increased need to supply equipment for work from home (eg, laptops, headsets, monitors)</li> <li>• Loss of hands-on training for procedures (eg, cadaver dissection, procedural training) that are difficult to replicate virtually</li> <li>• Loss of hands-on training for direct patient interaction (eg, objective structured clinical examinations)</li> <li>• Faculty discomfort with virtual teaching</li> <li>• Challenges to student/trainee onboarding and orientation</li> <li>• “Zoom” (virtual meeting) fatigue</li> </ul>  |
| <p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Energizes strategies to optimize virtual work and virtual teaching and learning (eg, develop “playbooks”)</li> <li>• Chance to improve virtual student/trainee onboarding</li> <li>• Tighten the interface between undergraduate medical education and graduate medical education (eg, by focusing on areas of common impact like virtual interviewing, holistic assessment, and diversity and inclusion)</li> <li>• Leading through crisis</li> <li>• Discover and strengthen personal attributes of compassion, resilience, and posttraumatic growth</li> </ul>  | <p><b>Threats (Ongoing Challenges)</b></p> <ul style="list-style-type: none"> <li>• Accelerated loss to the workforce of those averse to or challenged in adapting to virtual work</li> <li>• For clinicians and trainees, loss of networking and learning due to the inability to attend/present at conferences</li> <li>• For trainees, concerns over risk of not graduating or being certified because of lack of clinical hours/experience</li> <li>• Concerns by students and trainees about moving to new places (during transitions from medical school to residency or residency to fellowship) without prior opportunities to visit</li> <li>• Concerns by trainees that financial losses by health care institutions might cause posttraining job offers to be rescinded</li> <li>• Budgetary shortfalls that have been widely experienced by hospitals following the pandemic could curtail funding for education at a time when educational innovation is needed.</li> </ul> |

almost invariably have been confirmed by discussions with colleagues at other institutions, presents an analysis of the strengths, weaknesses, opportunities, and threats (SWOT) posed to education and to educators by the pandemic framed by local experience.

The SWOT analysis is a time-honored tool for helping to formulate organizational strategy; SWOT analysis calls on candid assessment of organizational resources (strengths and weaknesses) in the context of external realities (opportunities and threats).<sup>4</sup> For purposes of this analysis, the language of SWOT is amended to reflect advantages (strengths), disadvantages (weaknesses), ongoing challenges (threats), and opportunities. For clarity, the text is segmented into Strengths/Advantages, Weaknesses/Disadvantages, Threats/Ongoing Challenges, and Opportunities. Table 1 summarizes the analysis.

## Strengths/Advantages

Educational benefits have accompanied the many obvious adverse effects of the pandemic. The need for isolation and staying home has accelerated broadly the adoption of both virtual care and virtual teaching and learning. Such efforts were already under way before the pandemic in many places, but the pandemic has accelerated this effort tremendously. For example, at the Cleveland Clinic Foundation, the percentage of clinic visits that are conducted virtually exploded from 1% of all visits before the pandemic to >60% of all visits by April 2020.

Similarly, the pandemic has accelerated the adoption of virtual teaching and learning. Classroom lectures in medical school and graduate medical education (GME) programs are now being offered virtually, as are national meetings of official medical societies like the American Thoracic Society and the American College of Chest

Physicians and many continuing medical education meetings. The result of this precipitous forced adoption is that experience with teaching and learning virtually is creating a bank of experience that is being cataloged as best practices; indeed, many institutions are developing playbooks that are being shared widely about how to teach virtually with the use of various platforms. For example, because giving a virtual lecture obligates the presenter to stare at a screen, thereby not seeing and “reading” the audience as would occur in a live presentation, punctuating lectures with periodic questions for the audience is advised. This step can be enhanced by the use of a polling function in the virtual platform, which further drives interaction with learners. Encouraging those who are asking questions or comments to activate their video cam enlivens the dialog for the entire group. Furthermore, virtual platform “superusers” are being identified as resources to help internal faculty and visiting professors optimize their presentations, thereby using the full spectrum of available platforms and features.

In a similar vein, as an ongoing opportunity, the need to isolate socially has accelerated the adoption of virtual work. In my experience, although many educators were facile with and fully embraced virtual work before the pandemic, others have been catapulted into virtual work, frequently with the surprise appreciation that working virtually can enhance satisfaction and productivity. Virtual work also honors flexibility and can enhance efficiency (eg, by eliminating the “travel time” between live meetings). Local experience suggests that the number of virtual participants in standing meetings that have transitioned to virtual generally exceeds the number of prior live participants, whether because physical travel to meetings is eliminated or because some feel “safer” participating virtually. As an example, the monthly Cleveland Clinic Foundation Education Institute Grand Rounds, which previously were attended live by 20 to 40 individuals, was consistently attended virtually by 80 to 100 people in March and April 2020. This experience of increased virtual meeting participation is echoed by colleagues’ experiences in other institutions; of course, logging on to a virtual meeting does not indicate full engagement with the material; multitasking or attending multiple virtual meetings simultaneously can detract from attention.

Notwithstanding the upside of casual encounters between colleagues that occur when walking to face-to-face meetings,<sup>5,6</sup> there is a new appreciation that this travel time between live meetings consumed hours in a

week; its avoidance is a nod to efficiency after the pandemic. A related benefit of virtual work has been the possibility of enhanced teamwork, communication among teams, and participation that has occurred during the pandemic. Both clinical and educational benefits have resulted. Teams at my institution that previously met face-to-face once a week, including the education leadership team with clinician educators, are now huddling daily. The appetite for greater frequency is likely also fueled by the widely shared social isolation that makes seeing and engaging with colleagues a welcome respite.

Finally, the need for social isolation and spacing has forced reconsideration of how best to onboard and orient new medical students and trainees. Large group meetings that once were the norm are infeasible now, spawning innovative solutions. For example, orientation to incoming residents and fellows that was previously live is now being conducted in a hybrid format, with virtual components that can be done asynchronously combined with some face-to-face components (eg, for obligate in-person interaction like N95 mask fitting and various signed attestations). These face-to-face components often have appointment times to assure social distance spacing.

## Weaknesses/Disadvantages

Of course, the obverse sides of these strengths and opportunities are some weaknesses or disadvantages that naturally accrue to social isolation and virtual work. First, for some, the home environment may be very distracting (eg, noise, kids’ needs, many competing demands). Virtual work largely precludes the spontaneous interactions that characterize office-based work (eg, the conversations around the water cooler or the walking down the hall to discuss an emerging idea with a colleague). Such spontaneous interactions, called “collisions” by Coyle,<sup>6</sup> often foster creativity, which is blunted by virtual work. Many appropriately bemoan the loss of celebratory ceremonies, like resident award dinners and student and trainee graduations, which have been broadly a casualty of the pandemic.

A corollary effect of this general erosion of live social fabric might be a diminution of the camaraderie that comes from sharing a cup of coffee or a meal with a colleague. In the Education Institute at the Cleveland Clinic, a time-honored practice has been the Chairman’s Lunch, in which randomly selected members of the Education Institute are invited in groups of 10 to 12 to convene for lunch with the chairman and get to know

one another by sharing life stories and engaging in psychologically safe dialog. The high degree of organizational engagement in the Education Institute has been ascribed to events like these and to frequent institute-wide town halls and live grand rounds, all of which have disappeared currently and are unlikely to return imminently. As countermeasures, virtual Chairman's Lunches and weekly town halls (that have been attended by almost all members of the Education Institute) have been implemented.

Virtual work also creates the need for home equipment (eg, laptops, second monitors, headsets) and software/applications to facilitate the work, with associated costs. Similarly, virtual work also requires adequate connectivity for both the institution and the individual. Meeting interruptions because of technology or user snafus have become a seemingly universal experience and highlight the benefit of staffing virtual meetings with a "superuser" host who can orient users and troubleshoot. Finally, there is the seemingly ubiquitous "Zoom fatigue," which is the desensitized state that results from being on a consecutive parade of virtual meetings on any of several platforms. Notwithstanding its efficiency, the tight schedule of back-to-back virtual meetings has been characterized by colleagues, including clinical educators, as "a weird busy."

### Threats/Ongoing Challenges

Ongoing threats and challenges that result from the pandemic are embedded in these weaknesses. Has the pandemic and the precipitous transition to virtual work done irreparable damage to the camaraderie of the office and learning environments? Such camaraderie, the social fabric of the workplace, is important to high performance. For example, in the *The Culture Code: The Secrets of Highly Successful Groups*, Coyle<sup>6</sup> emphasizes that high-performing teams are characterized by workplace proximity and effusive interaction among colleagues, which includes sharing discussions about personal matters like family. Similarly, in her work *High Performance Healthcare: Using the Power of Relationships to Achieve Quality, Efficiency, and Resilience*, Gittel<sup>7</sup> shows that "relational coordination," colleagues' having shared goals, knowledge, and mutual respect as supported by frequent problem-solving communication, is associated highly with better surgical outcomes. The threat to camaraderie poses a risk for team erosion. Countermeasures like frequent huddles among teams and celebrating calling colleagues by phone for spontaneous conversations are warranted.

As another concern, for those who are averse to virtual work, either because of technical challenges or the deep need for live interaction with colleagues, could there be an acceleration toward retirement? To the extent that some of these individuals may be senior members of the organization with long institutional tenure, this threat poses the risk of losing organizational experience. Another perceived threat and concern that is experienced mostly by trainees regards getting sufficient clinical experience to achieve entrustable professional status or even, for some programs, satisfying graduation criteria. This may be especially acute in procedural specialties in smaller programs in which threshold values for some more uncommon procedures may have been marginally satisfied even before the pandemic.

Another threat of the pandemic has been to the financial well-being of health-care organizations. To manage the tremendous budgetary shortfalls that have been widely experienced by all hospitals related to cancelling elective surgeries and many outpatient services, many institutions have implemented furloughs or layoffs, salary cuts, or curtailment of contributions to retirement plans. Watching these events has caused concern by some trainees, which is now confirmed by experience, that posttraining position offers will be rescinded because the organizations they are joining are in financial distress. Similarly, for faculty, threats to educational funding could handicap their efforts to innovate (eg, for securing time to develop playbooks for virtual interviewing, serving on task forces on diversity and inclusion, or for receiving funds to support educational research).

### Opportunities

Finally and thankfully, as a "silver lining," many opportunities, both educational and clinical, have been introduced by the pandemic. The push to develop novel virtual teaching methods, to develop on-line methods to showcase medical school and GME programs and to interview when travel is no longer possible, to develop novel vaccines with historically unprecedented speed, to invent new basic ventilators, and to develop multiplex ventilation strategies exemplifies just a few of the resulting educational and clinical innovations. Much like the acceleration of virtual clinical care, which was desired but stuttered before the pandemic, so too have experience and expertise with virtual teaching and learning been propelled forward by the pandemic. This rapidly gained experience invites codifying best practices in

**TABLE 2 ] A Checklist of Selected Specific Educational Actions to Respond Optimally to the Pandemic**

|  |
|--|
| Review best practices from both local and national experience to develop playbooks:  |
| For educators:   |
| Best practices in virtual teaching for educators   |
| How to conduct virtual interviews, including virtual holistic assessment of the candidate  |
| For students and trainees:   |
| How to interview virtually   |
| Develop a “superusers” group that is knowledgeable in use of all virtual platform types (eg, Zoom, Webex, Microsoft teams); members of this group can help facilitate virtual presentations  |
| Reassess space needs for educational activities (with attention to social distancing, disinfection, etc. for any planned live meetings). In addition, consideration should be given to creating spaces for optimal virtual teaching and for trainees to take on-line examinations. |
| Reassess work patterns for faculty/educators regarding working virtually vs being in the office  |
| Communicate frequently with faculty regarding the impact of the coronavirus pandemic on teaching activities, schedule, platform options, and how to facilitate presentations   |
| Provide “elbow support” for faculty needing help with virtual work, virtual care, and virtual presentations  |

virtual teaching and learning; playbooks of “how to’s” and “do’s and don’ts” are already proliferating to pedagogic advantage. Opportunities to innovate and gain experience with virtual teaching are replete, as are opportunities to study the impact of virtual pedagogy.

The pandemic has also created an impression that administrative and educational space (including classrooms, library), which classically were highly coveted and competed for in academic medical centers, might actually be decreased, thereby potentially shrinking the physical footprint for education and administration. Although reallocating space may be an institutional opportunity, the pandemic has created the need to rethink and also potentially defend the physical resources for both education and administrative functions.

The disruption of traditional, live undergraduate medical education (UGME) and the transition of graduating medical students to their new roles as residents has tightened the alignment between UGME and GME. A new focus on developing optimal strategies to conduct virtual interviews straddles both worlds, and evolving playbooks are already helpful both to medical students applying for residencies and to residents applying for fellowships. Similarly, in revamping the whole interview process to virtual, educators are paying renewed attention to holistic assessment of candidates and implicit bias and to achieving broad diversity and inclusion goals across the swath of UGME and GME. Recognizing the commonality of interest and potential synergy, task forces that address both issues are often

comprised of leaders from both the UGME and GME communities. Although these activities were certainly underway before the pandemic, the pandemic has focused and accelerated these efforts. The need to respond quickly and to share best practices within academic medical centers has created new alliances between UGME and GME educators.

Regarding the full spectrum of educational, clinical, and research activities in academic medical centers, the pandemic crisis invites, indeed requires, great leadership,<sup>8</sup> creating opportunities for incumbent organizational leaders to navigate complex circumstances and for organic, “little l” leaders to emerge<sup>9</sup>; every day, health-care providers are leading and innovating educational and clinical care processes without formal leadership titles. At all academic medical centers, the acuity of change prompted by the pandemic has required quick action and the assumption of new, previously undescribed roles by faculty (eg, leading the effort to develop virtual teaching and interviewing strategies, standing up a surge hospital; leading the transition to virtual interviewing for all trainees and medical students; leading efforts to redeploy physicians [including trainees] for a surge; guiding resumption of surgical services). “Battlefield promotions” have resulted, and leadership roles have been forged in the coronavirus crucible. In the context that leadership development depends on “experiential leadership” in which success in leadership roles begets progressive opportunities to lead in roles of expanding scope, the pandemic has rapidly created an expanded, battle-tested leadership pipeline for academic medical centers, including in education. Of



course, mirroring the overall double effect of the pandemic (which justifies the SWOT analysis), such battlefield promotions bring both the opportunity of leadership and the concomitant burden of incremental responsibilities to already busy people. Attentive leaders must appreciate the potential disproportionate impact on women faculty, for whom assuming greater burdens in the home during the pandemic may hamper their ability to take on these additional roles.

On an individual level, beyond jumpstarting leadership pipelines, the coronavirus pandemic has given all of us the opportunity to examine our values and occasions for virtue. Reports about acts of compassion fill newscasts and social media: in education, medical students have volunteered to help trainees with child care needs; senior medical students have sought early graduation to care for patients with coronavirus disease 2019; and faculty have led task forces to combat social injustice. Beyond education, health-care providers have come out of retirement to volunteer in coronavirus disease 2019 surge areas; neighbors have delivered meals to elderly individuals in their community; those who have been furloughed have volunteered in foodbanks, and on and on. Because virtue only occurs when we act,<sup>10</sup> the pandemic has provided the tragic stage on which many virtuous acts have occurred, and the self-reflection has allowed us to double down on our commitment to act virtuously. In keeping with Plutarch and/or Dr Otto Rank's observation that "What we achieve inwardly will change outer reality"<sup>11</sup> and that we get good at what we do when we are good at who we are, the pandemic has provided an environment to foster virtue, excellence, and resilience.

In summary, even in the face of the tremendous disruption and tragedy wreaked by the coronavirus pandemic, opportunities abound to respond with

integrity and to innovate in clinical care and in education. Table 2 offers a checklist of specific actions that might comprise an optimal educational response to the pandemic. Those who embrace these opportunities will thrive, as will their organizations and students.

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## References

1. Rosenthal J. A terrible thing to waste. *New York Times*. July 31, 2009. <https://www.nytimes.com/2009/08/02/magazine/02FOB-onlanguage-t.html>. Accessed July 16, 2020.
2. Wong JJ, John F. Kennedy crisis quotes. Inspiration Boost. <https://www.bing.com/search?q=john+f+kennedy+crisis+quote&form=EDGHPT&q=AS&cvid=7d40029a89314b7b9ab643eae1b6e91b&refig=2274a323d7744a8dad6f6b47a301f5c8&cc=US&setlang=en-US&plvar=0>. Accessed May 15, 2020.
3. Clough JD. *To Act as a Unit: The Story of the Cleveland Clinic*. 5th ed. Cleveland, OH: Cleveland Clinic Press; 2012.
4. SWOT analysis: How to develop a strategy for success. [https://www.mindtools.com/pages/article/newTMC\\_05.htm](https://www.mindtools.com/pages/article/newTMC_05.htm). Accessed August 20, 2020.
5. Stoller JK. A physician's view of hospital design: the impact of verticality on interaction. *Architecture*. 1988;77(12):121-122.
6. Coyle D. *The Culture Code: The Secrets of Highly Successful Groups*. New York: Bantam Books; 2018.
7. Gittel JH. *High Performance Healthcare: Using the Power of Relationships to Achieve Quality, Efficiency, and Resilience*. New York: McGraw-Hill; 2009.
8. Stoller JK. Reflections on leadership in the time of COVID-19. *BMJ Leader*. <https://bmjleader.bmj.com/content/early/2020/04/07/leader-2020-000244>. Accessed October 20, 2020.
9. Bohmer R. Leadership with a small "l." *BMJ*. 2010;340(●●):c483.
10. Rea P, Stoller JK, Kolp A. *Exception to the Rule: The Surprising Science of Character-Based Culture, Engagement, and Performance*. New York: McGraw-Hill Education; 2018.
11. Whatever we achieve inwardly will change outer reality. <https://quoteinvestigator.com/2016/12/14/inward/>. Accessed May 18, 2020.